Attorney Docket No. **09792909-5699** PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:	)	Group Art Unit: **2862**
	)	
Manabu Aizawa, et al.	)	
	)	Confirmation No.: 7047
Application No. **10/685,924**	)	
	)	
Filed: **October 15, 2003**	)	Examiner: **Kenneth Whittington**
	)	
For: MAGNETIC AZIMUTH MEASUREMENT APPARATUS	))	

MAIL STOP AFTER FINAL
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOVEMBER 22, 2006 FINAL OFFICE ACTION

Dear Sir:

This Amendment is submitted in response to the Final Office Action mailed November 22, 2006. Applicants respectfully request amendment of the application, and reconsideration and allowance of the pending claims.

IN THE CLAIMS

This listing of the claims replaces all prior listings of claims.

Listing of Claims:

1. (Currently Amended) A magnetic azimuth measurement apparatus comprising:

a magnetic detection unit having ~~two~~ three or more magnetic detection devices with directionality, the magnetic detection devices being disposed at equal angular intervals based on a predetermined rule in such a way that directionalities thereof are different from each another;

a sampling unit for sequentially switching and sampling electromagnetic conversion outputs of magnetic detection devices of the magnetic detection unit;

a condition determining unit for determining whether or not the electromagnetic conversion output being sequentially switched and sampled by the sampling unit meets a predetermined condition; and

an azimuth information output unit for outputting magnetic azimuth information based on a result of the determination of the condition determining unit,

wherein,

each of the ~~two~~ three or more magnetic detection devices of the magnetic detection unit comprises a thin film magnetic core, a thin film excitation coil and a thin film detection coil around the magnetic core, and

the ~~two~~ three or more magnetic detection devices disposed in a wheel-spoke arrangement with their cores positioned to point along their respective axes from a common point.

2. (Cancelled)

3. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

each magnetic azimuth device of the magnetic detection unit comprises a magnetic core made of a soft magnetic material, an excitation coil for exciting thereof, and a detection coil for detecting an external magnetic field.

4. (Cancelled)

5. (Currently Amended) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

in the magnetic detection unit, the thin film excitation coils corresponding to the ~~two~~ three or more magnetic detection devices are configured to form one excitation coil ~~is~~ shared by the ~~two~~ three or more magnetic detection devices.

6. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 5, wherein:

in the magnetic detection unit, all the magnetic detection coils have the same one end.

7. (Cancelled).

8. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

the excitation coil and detection coil for each of the magnetic detection devices are formed with a two-layer structure.

9. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 3, 5, or 6 wherein:

the magnetic core comprises a material that enable provision and elimination of inductive magnetic anisotropy to be carried out with heat treatment in a magnetic field.

10. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

the sampling unit switches electromagnetic conversion outputs of the magnetic detection devices, and performs synchronous detection of a switched signal with a predetermined frequency, thereby sampling a voltage change corresponding to an external magnetic strength.

11. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

the sampling unit sequentially operates switches in response to a signal from a binary counter if the number of detection coils of the magnetic detection devices is set to be 2^n, the number of the switches being the same as that of the detection coils.

12. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 1, wherein:

the condition determining unit supplies a trigger signal to the azimuth information output unit as a result of determination if the electromagnetic output being sequentially sampled by the sampling unit is a maximum, a minimum, or zero crossing.

13. (Previously Presented) The magnetic azimuth measurement apparatus according to Claim 12, wherein:

the azimuth information output unit outputs a signal for switching, which is sampled by the sampling unit if the trigger signal is received from the condition determining unit, as information indicating an azimuth of the external magnetic field.

14. (Cancelled)

15. (Currently Amended) A magnetic azimuth measurement apparatus comprising:

a magnetic detection unit having ~~two~~ three or more magnetic detection devices with directionality, the magnetic detection devices being disposed at equal angular intervals based on a predetermined rule in such a way that directionalities thereof are different from each another;

a sampling unit for sequentially switching and sampling electromagnetic conversion outputs of magnetic detection devices of the magnetic detection unit;

a condition determining unit for determining whether or not the electromagnetic conversion output being sequentially switched and sampled by the sampling unit meets a predetermined condition; and an azimuth information output unit for outputting magnetic azimuth information based on a result of the determination of the condition determining unit,

wherein,

each of the ~~two~~ three or more magnetic azimuth devices of the magnetic detection unit comprises a thin film radial magnetic core, said magnetic core insulated by an insulating layer and made of a soft magnetic material, a thin film excitation coil, and a thin film detection coil around the magnetic core, and

the ~~two~~ three or more magnetic detection devices disposed in a wheel-spoke arrangement with their cores positioned to point along their respective axes from a common point.

REMARKS

Claims 1, 3, 5, 6, 8 – 13, and 15 are pending and under consideration in the above-identified application.

In the Office Action, Claims 1, 3, 5, 6, 8 – 13, and 15 were rejected.

In this Amendment, Claims 1, 5 and 15 are amended. No new matter has been introduced as a result of this amendment.

Accordingly, Claims 1, 3, 5, 6, 8 – 13, and 15 remain at issue.

I. 35 U.S.C. § 103 Obviousness Rejection of Claims

Claims 1, 3, 5, 6, 8-13 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rovner (U.S. Patent No. 3,825,823) in view of Fragola et al. ("Fragola") (U.S. 2,389,146) and Yamada et al. ("Yamada") (U.S. Patent No. 6,407,547).

Claim 1 is directed to a magnetic azimuth measurement apparatus. The magnetic azimuth measurement apparatus comprises a magnetic detection unit, a sampling unit, a condition determining unit, a condition determining unit, and an azimuth information output unit.

Amended Claim 1 recites that the three or more magnetic detection devices disposed in a wheel-spoke arrangement with their cores positioned to point along their respective axes from a common point. This amendment finds support on page 22, lines 24 – 29 of the Specification and Figure 19.

The Examiner states that Fragola does teach a segmented flux valve, with each segment comprising a core, an exciting coil and a detection coil oriented in a radial pattern. Fragola teaches that these segments form a polygon, having as many sides as magnetic detection units. Thus, in Fragola the cores of the magnetic detection units are disposed along the periphery of the formed polygon. Consequently, only two cores of these magnetic detection units are positioned to point along their respective axes from a common point, which is also positioned on the periphery of the polygon rather than three or more magnetic detection devices disposed in a wheel-spoke arrangement with their cores positioned to point along their respective axes from a common point.

Hence, Applicants submit that none of the cited references, Rovner, Fragola and Yamada, teach or suggest that three or more magnetic detection devices disposed in a wheel-spoke arrangement with their cores positioned to point along their respective axes from a common point.

Accordingly, Claim 1 is patentable over Rovner, Fragola and Yamada et al., taken singly or in combination with each other, as are dependent Claims 3, 5, 6, and 8 – 13 for at least the same reasons.

Independent Claim 15 has been amended to recite the same distinguishing feature as that of Claim 1. Thus, Claim 15 is also patentable over Rovner, Fragola and Yamada et al., taken singly or in combination with each other.

Applicants respectfully request that the claim rejection under 35 U.S.C. § 103 be withdrawn.

II. **Conclusion**

In view of the above amendments and remarks, Applicant submits that Claims 1, 3, 5, 6, 8 – 13, and 15 are clearly allowable over the cited prior art, and respectfully requests early and favorable notification to that effect.

Respectfully submitted,

Dated: Feb 22, 2007

By:
David R. Metzger
Registration No. 32,919
SONNENSCHEIN NATH & ROSENTHAL LLP
P.O. Box 061080
Wacker Drive Station, Sears Tower
Chicago, Illinois 60606-1080
(312) 876-8000